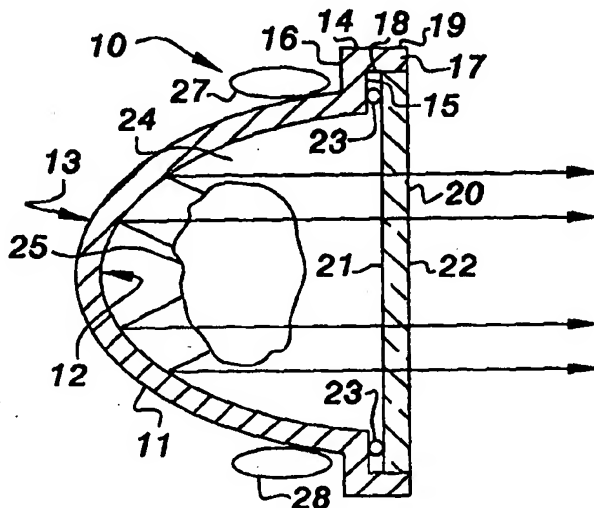


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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(21) International Application Number: PCT/US97/22304 (22) International Filing Date: 16 December 1997 (16.12.97) (30) Priority Data: 08/771,757 20 December 1996 (20.12.96) US (71) Applicant (for all designated States except US): FUSION LIGHTING, INC. [US/US]; 7524 Standish Place, Rockville, MD 20855 (US). (72) Inventors; and (75) Inventors/Applicants (for US only): KNOX, Richard, M. [US/US]; 5231 Norborne Lane, Houston, TX 77069 (US). MERCER, William, Burton [US/US]; 6603 Moccasin Bend, Spring, TX 77379 (US). WALKER, Dale, S. [US/US]; 12318 Advance Drive, Houston, TX 77065 (US). (74) Agents: STEINER, Paul, E.; Fusion Lighting, Inc., 7524 Standish Place, Rockville, MD 20855 (US) et al.	(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, GW, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>	

(54) Title: ELECTRODELESS LAMP WITH SEALED CERAMIC REFLECTING HOUSING**(57) Abstract**

An electrodeless lamp (10) for producing an intense beam of light includes a concave lamp body (11) that surrounds the lamp interior. A gas, such as sulfur or selenium or compounds thereof, is contained within the lamp body (11) for forming a plasma light source. The concave lamp body (11) has a reflecting surface (12). Electrodes (27, 28) are disposed external to the lamp body for producing radio frequency energy for exciting the gas. A heat resistant glass plate (20) seals the concave lamp body (11). A frit seal (23) can be used for forming a pressure and temperature resistant seal between the concave lamp body (11) and the glass plate (20). The light beam generated by the plasma exists through the glass plate (20).

EX 1258

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Title: ELECTRODELESS LAMP WITH SEALED CERAMIC REFLECTING HOUSING

SPECIFICATION

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a high temperature, high efficiency lamp apparatus with
5 an improved, frit sealed ceramic housing that produces a beam of light using a fill contained
under pressure within the lamp housing interior that is energized with externally placed
electrodes for vaporizing the gas to form a plasma. More particularly, the present invention
relates to a projecting system that features a high temperature electrodeless lamp in which light
energy is generated by a plasma contained inside a frit sealed ceramic body or housing that has
10 a concave reflector surface surrounding the lamp body interior.

2. Description of the Related Art

High power lamps are used for illumination applications beyond typical incandescent and
fluorescent lamps. One type of lamp known as a high intensity discharge (HID) lamp consists
15 of a glass envelope which contains electrodes and a fill which vaporizes and becomes a gas when
the lamp is operated.

Recently, a patent issued for a high power lamp that utilizes a lamp fill containing sulfur
or selenium or compounds of these substances. U.S. Patent 5,404,076, issued to Dolan, et al., and
entitled "Lamp Including Sulfur" discloses an electrodeless lamp utilizing an excited fill. The
20 Dolan, et al., patent 5,404,076 is incorporated herein by reference.

Projecting systems are used to display images on large surfaces, such as movie or
television screens and computer displays. For example, in a front projection system, an image
beam is projected from an image source onto the front side of a reflection-type angle
transforming screen, which then reflects the light toward a viewer positioned in front of the
25 screen. In a rear projection system, the image beam is projected onto the rear side of a
transmission-type angle transforming screen and transmitted toward a viewer located in front of
the screen.

In prior co-pending U.S. patent application serial no. 08/581,108, entitled "Projecting
Images," to Knox, filed December 29, 1995, there is disclosed a method of displaying an optical

image by projecting the image along an optical path and at an optical device interposed across the optical path, at one time reflecting the image from the optical device and at a different time permitting the image to pass through the optical device to be displayed. U.S. patent application serial no. 08/581,108, filed December 29, 1995, is incorporated herein by reference. A projection
5 system for such a display is disclosed in U.S. application serial no. 08/730,818, entitled "Image Projection System Engine Assembly," to Knox, filed October 17, 1996, which is hereby incorporated by reference.

The image source for a projection system employs a light that must be of high intensity and preferably very efficient. Such a light is disclosed in U.S. patent application serial
10 no. 08/747,190, entitled "High Efficiency Lamp Apparatus for Producing a Beam of Polarized Light," to Knox, et al., filed November 12, 1996, which is hereby incorporated by reference. If an optical image is to be displayed by projection, it sometimes passes through an optical device interposed across the optical path. In the projection system of prior co-pending application serial no. 08/581,108, filed December 29, 1995, one or more optical devices reflect the image at one
15 time from the optical device and at a different time permit the image to pass through the optical device to be displayed. There will be a decrease in light intensity once the optical image strikes the optical device interposed across the optical path. Therefore, in projection systems where an optical device is interposed across the optical path there is a need for a projection engine with a high intensity light of improved efficiency.

20

SUMMARY OF THE INVENTION

The present invention provides an improved high efficiency lamp apparatus for producing an intense beam of light using a plasma light source. The apparatus includes an electrodeless lamp body, preferably of ceramic or like heat resistant material. The lamp body has a concavity
25 that surrounds a lamp interior.

A clear glass plate seals one end portion of the housing. A fill is contained within the lamp body interior. The fill is preferably sulfur or selenium or a combination thereof that can be excited to form a plasma light source.

The lamp body provides a concavity with a reflective surface thereon. Electrodes are
30 positioned externally of the lamp body for producing radio frequency (or RF or Microwave) energy that enables the gas in the lamp body cavity to be excited and form the plasma light source that generates intense heat (about 800°C to 1200°C) and an intense light beam. As used herein,

the term radio frequency means a frequency range sufficient to excite a fill in the bulb (e.g., about 150 MegaHertz to about 10 GigaHertz, or other suitable frequency.

The clear (e.g., glass, quartz, sapphire, or any optically clear material) plate seals the gas within the interior of the housing and allows light to escape the housing.

5 A frit seal can be used for a connection between the lamp body at its peripheral edge and the periphery of the glass lens. The glass lens is preferably a quartz plate or like material that is clear and which can withstand high temperature.

BRIEF DESCRIPTION OF THE DRAWINGS

10 For a further understanding of the nature and objects of the present invention, reference should be had to the following detailed description, taken in conjunction with the accompanying drawings, in which like parts are given like reference numerals, and wherein:

Figure 1 is a sectional elevational view of a first embodiment of the lamp apparatus of the present invention;

15 Figure 2 is a sectional elevational view of a second embodiment of the lamp apparatus of the present invention;

Figure 3 is a sectional elevational view of a third embodiment of the lamp apparatus of the present invention;

20 Figure 4 is sectional elevational view of a fourth embodiment of the lamp apparatus of the present invention;

Figure 5 is a partial perspective view of the fourth embodiment of the lamp apparatus of the present invention;

Figures 6-7 are sectional elevational views of the fifth and sixth embodiment of the apparatus of the present invention showing additional seal geometries;

25 Figures 8A and 8B are a sectional elevational view showing an alternative seal; and

Figures 9 and 10 are side views of a system suitable for use of the apparatus according to the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

30 Figure 1 shows generally the first embodiment of the apparatus of the present invention designated generally by the numeral 10. Lamp apparatus 10 includes housing or body 11 having inner concave surface 12 and outer convex surface 13. Housing 11 provides an open end portion surrounded by annular flange 14 having inner flat surface 15 and outer surface 16. Annular

shoulder 17 extends from annular flange 14. Annular shoulder 17 has inner surface 18 and outer surface 19. Housing 11 is preferably ceramic.

Clear circular plate 20 is preferably of an optically clear material that is heat resistant such as glass, quartz, or sapphire. Plate 20 is connected to lamp housing 11 at annular flange 14 and
5 annular shoulder 17. Circular plate 20 has inner surface 21 and outer surface 22.

The connection between lamp housing 11 and circular plate 20 is perfected using frit seal 23 that is positioned in between annular flange 14 at surface 15 and circular plate 20 as shown in Figure 1. A frit seal is a seal made by fusing together glass powders with a glass binder. However, seal 23 can also be a brazing seal or a direct bond type seal 120 (see Figure 8A),
10 melting the glass or a clear ceramic such as sapphire to the ceramic. Seal 23 could also be formed by metalizing that portion of the ceramic housing 11 and that portion of the plate 20 at the joint, then welding metal 121 to metal 122 at the metalized coatings (see Figure 8B). A connection 30 is formed between plate 20 and housing 11.

An interior space 24 is defined by the concavity of housing 11 and circular plate 20.
15 Interior 24 contains a fill medium such as a sulfur or selenium fill, or compounds of these substances. The gas contained within interior 24 is a fill that can be excited using radio frequency energy, for example, to form a plasma light source 25.

Electrodes 27 and 28 are shown in Figure 1, positioned externally of lamp housing 11 and spaced away from the outer surface 13 of housing 11. Electrodes 27, 28 are thus not subjected
20 to the intense heat of plasma light source 25.

Reflecting surface 12 can be a high reflectivity ceramic surface, preferably a diffuse reflection (e.g., white ceramic). This produces a collimating lamp apparatus 10 that generates light rays 29 that are generally parallel. A variety of shapes are possible other than the curved shape of housing 11 and square shape of housing 32 of Figure 2. Different shapes can be
25 employed to force the plasma itself into different shapes or to provide different sealing properties between the clear material and the ceramic.

Figure 2 discloses a second embodiment of the lamp apparatus of the present invention, designated generally by the numeral 31. Lamp apparatus 31 provides a housing 32 that has cylindrically shaped side wall 33 and flat circular end wall 34 that are integrally formed.
30 Housing 32 can be of a heat resistant material such as ceramic.

Inside flat surface 35 is provided at circular end wall 34. Cylindrical shaped inner surface 36 is formed at cylindrically side wall 33. Outer surfaces 37, 38 are also shown in Figure 2 as being respectively circular and cylindrical in shape.

Lamp housing 32 has an open end 39 that is covered with a circular filter 40, such as a polarizing filter. Circular filter 40 has a peripheral surface 41 that forms a connection at 42 with lamp housing 32. Filter 40 has an inside surface 43 and an outer surface 44. Inside surface 43 connects to peripheral surface 41 of housing 32 at connection 42. Connection 42 preferably includes a frit seal. However, seal 42 can also be a brazing seal or a direct bond type seal, melting the glass to the ceramic. Seal 42 could also be formed by metalizing that portion of the ceramic housing 32 and that portion of the filter 40 at the joint, then welding metal to metal at the metalized coatings. A connection 30 is formed between filter 40 and housing 32.

A second plate 45 is positioned in between a plasma light source 47 and a filter 43. Plate 45 is preferably an optically clear plate of high temperature resistant material, such as quartz, sapphire, or the like. Connection 46 designates a connection between plate 45 and cylindrical inner surface 36 of housing 32.

Plasma light source 47 is formed within an interior 51 of housing 32. Interior 51 contains a fill (such as sulfur, selenium, or compounds thereof) that can be excited to form plasma light source 47. Plasma light source 47 is not a well defined ball, but occupies the central area of interior 51.

A pair of electrodes 49, 50 provide radio frequency energy that can excite the gas with interior 51 to form plasma light source 47. Interior 52 of housing 32 is that space between filter 43 and glass plate 45. Interior 52 is filled with a gaseous substance that forms an insulation layer between plate 45 and plate 43.

Plate 43 can be a polarizing film filter that may not be able to withstand the intense heat generated within interior 51 of lamp housing 32. Therefore, insulating gaseous layer 52 is provided in between plates 43 and 45 to prevent heat damage to film plate 43. Light rays 53 are shown in Figure 2 as being emitted from lamp housing 32, passing through glass plate 45 and filter 43. In the embodiment of Figure 2, the light 53 is polarized having passed through the polarizing filter 43.

In Figure 3, a third embodiment of the apparatus of the present invention is shown, designated by the numeral 54. Lamp apparatus 54 has cylindrical housing 55, that includes flat circular end wall 56, inside flat surface 57, inside cylindrical surface 58, and outer surface 59. The surfaces 57, 58 define with circular plate 62 an interior 60 for containing a fill that can be excited (such as sulfur or selenium gas or compounds thereof) to form plasma light source 73. Lamp housing 55 has open end 61 that is covered by circular plate 62. Plate 62 has inner surface 70 and outer surface 71.

Housing 55 provides peripheral flange 63 and annular shoulder 64. Flange 63 has inner surface 65 and outer surface 66. Annular shoulder 64 has outer surface 67 and inner surface 68. Frit seal 69 forms a seal in between plate 62 and annular flange 63. A connection 72 is formed in between the annular shoulder 64 and plate 62.

5 Plasma light source 73 is formed within gas containing interior 60 by energy from electrodes 75, 76. Electrodes 75 and 76 are shown in Figure 3 positioned externally of the lamp interior so that they are not subjected to the intense heat generated by plasma light source 73. Light rays 77 are shown exiting lamp apparatus 54.

In Figures 4 and 5, a fourth embodiment of the apparatus of the present invention is
10 shown designated by the numeral 78. Lamp apparatus 78 includes a housing or body (preferably ceramic) 79 having a concave reflective surface 80, an outer convex surface 81 and an interior 82. Interior 82 contains a fill medium such as sulfur, selenium, or compounds thereof, that can be excited to form a plasma light source 83.

Electrodes 85 and 86 are positioned externally of lamp housing 79 so that they are not
15 subjected to the intense heat of plasma heat source 83. Peripheral flange 87 is provided having outer surface 88 and inner surface 89. Clear plate 90 can be of a heat resistant glass such as quartz. Plate 90 has outer surface 91 and inner surface 92. Peripheral edge 93 of clear plate 90 forms a connection at 94 with lamp housing 79. Frit seal 95 is positioned in between lamp housing 79 and plate 90 as shown in Figure 4. Lamp housing 79 provides flat peripheral surface
20 96 that forms a connection with reflector 97. Reflector 97 also has a flat corresponding surface 98 that forms a connection with flat surface 96. Reflector 97 has peripheral edge 99 with recess 100 that receive filter 101. Filter 101 has peripheral edge 102 that forms a connection with shade 97 at recess 100.

Figures 6 and 7 show additional geometries for the frit seal type seal of Figure 3. In
25 Figure 6, an alternate version of the apparatus 54 of Figure 3 is shown with a different seal configuration. Lamp 104 is constructed as lamp 54 in Figure 3 but for the seal geometry. In Figure 6, housing 105 is shaped as housing 55 in Figure 3. However, the members 63, 64 differ in geometry. Housing 105 has a seal arrangement that includes a frit seal 110 positioned in between the plate 109 in Figure 6 (that corresponds to the plate 62 of Figure 3) and the plurality
30 of flanges 106, 107, 108. The flanges 106, 107, 108 form a C-shaped annular member that receives the seal 110.

In Figure 7, plate 116 corresponds to the plate 62 in Figure 3. The housing 113 corresponds to the housing 55 of Figure 3, but differs in geometry at the seal 116. In the

embodiment of Figure 7, lamp 112 includes a housing 113 having annular flanged portions 114, 115 that intersect at about ninety degrees relative to one another. A seal 117 can be a frit seal positioned in between annular edge 118 of annular flange 115 and the peripheral edge 119 of plate 116. Each of the seals of Figures 6 and 7 can be frit seals or brazed or welded. If welded, the surfaces of housings 105, 113 and the surfaces 109, 116 are first metalized so that metal to metal surfaces are provided for welding.

Figures 9 and 10 show a rear projection video system 260 that includes a linear reflecting polarizer 262 and an achromatic retarder 264 that allow light in a projected image 266 to reflect from a display screen 268 at one instance and to pass through the screen 268 at another instance. This allows for "optical folding," which allows the video system 260 to be very shallow yet project a large image, as described in the previously incorporated U.S. patent application entitled "Projecting Images." For the video system 260 to work properly, the image source 276 must produce polarized light. A wide variety of other types of video systems employ polarization in image formation.

Because many varying and different embodiments may be made within the scope of the inventive concept herein taught, and because many modifications may be made in the embodiments herein detailed in accordance with the descriptive requirement of the law, it is to be understood that the details herein are to be interpreted as illustrative and not in a limiting sense.

CLAIMS

What is claimed is:

1. A high efficiency lamp apparatus for producing an intense beam of light
5 comprising:
 - a) an electrodeless lamp body having a concavity that surrounds a lamp interior;
 - b) a fill contained within the lamp body interior;
 - c) the body having a concavity with a reflector surface thereon;
 - 10 d) a clear glass plate that seals the fill within the interior; and
 - e) wherein a light beam generated by the plasma exits the lamp body via the clear glass plate.
2. The high efficiency lamp apparatus of claim 1, wherein the lamp body is ceramic.
15
3. The high efficiency lamp apparatus of claim 1, wherein the lamp body has a peripheral edge and the glass plate attaches to the lamp body at the peripheral edge.
4. The high efficiency lamp apparatus of claim 3, wherein the plate attaches to the
20 body with a frit seal.
5. The high efficiency lamp apparatus of claim 3, wherein the plate attaches to the body by a weld.
- 25 6. The high efficiency lamp apparatus of claim 3, wherein the plate attaches to the body by a direct bond.
7. The high efficiency lamp apparatus of claim 1, wherein the lamp body includes a shaped reflector portion that is parabolic in longitudinal section.
30
8. The high efficiency lamp apparatus of claim 1, wherein the lamp body includes a generally cylindrically shaped portion.

9. The high efficiency lamp apparatus of claim 1, wherein the lamp body has an inner concave light reflecting surface.

5 10. The high efficiency lamp apparatus of claim 1 further comprising a polarizer supported at the lamp body for polarizing light emitted from the lamp housing.

11. The high efficiency lamp apparatus of claim 10, wherein the fill is sulfur.

10 12. The high efficiency lamp apparatus of claim 10, wherein the fill is selenium.

13. A high efficiency lamp apparatus for productivity of a beam of polarized light comprising:

a) an electrodeless lamp body in the form of concave walled shell having an
15 open end with a periphery;

b) a clear plate member fastened to the lamp body at the periphery, the plate and lamp body defining an interior;

c) the interior containing a fill that can be excited to form a plasma light
source; and

20 d) wherein a light beam generated by the plasma exits the lamp body through the clear plate member.

14. A high efficiency collimating lamp apparatus for producing a light beam of polarized light comprising:

25 a) an electrodeless hollow lamp body with an open end;

b) a clear closure plate that covers the open end of the body; and

c) a seal that holds the glass plate to the body so that the lamp body, closure
plate and seal define a chamber;

d) the chamber having an interior that contains a fill;

30 e) wherein external electrodes are not subjected to the intense heat generated at the plasma; and

f) the lamp body having an inner reflecting surface for reflecting and collimating light emitted by the plasma light source to form parallel rays of light exiting the open end of the body.

5 15. The high efficiency collimating lamp apparatus of claim 14, wherein the lamp body is ceramic.

 16. The high efficiency lamp apparatus of claim 15, wherein the plate attaches to the body with a frit seal.

10

 17. The high efficiency lamp apparatus of claim 15, wherein the plate attaches to the body by a weld.

 18. The high efficiency lamp apparatus of claim 15, wherein the plate attaches to the
15 body by a direct bond.

 19. The high efficiency collimating lamp apparatus of claim 14, wherein the clear closure plate is quartz.

20 20. A high efficiency lamp apparatus for producing of a beam of polarized light comprising:

 a) a ceramic, heat resistant, electrodeless lamp body having a concavity that surrounds a lamp interior and an open end;

 b) the concavity having a light reflective surface thereon;

25 c) the lamp interior containing a fill that can be excited to form a plasma light source;

 d) a light transmitting plate that seals the concavity;

 e) a frit seal forming the seal between the glass plate and open end of the lamp body; and

30 f) wherein a light beam generated by the plasma exits the lamp body via the open end and light transmitting plate.

21. The high efficiency lamp apparatus of claim 20, wherein the lamp body is ceramic.

22. The high efficiency lamp apparatus of claim 20, wherein the lamp body has a peripheral edge and the light transmitting plate attaches to the lamp body at the periphery.

23. The high efficiency lamp apparatus of claim 20, wherein the lamp body is generally cylindrically shaped.

24. The high efficiency lamp apparatus of claim 20, wherein the lamp body has an inner concave light reflecting surface.

25. The high efficiency lamp apparatus of claim 20, further comprising a polarizer supported at the lamp body for polarizing light emitted by the plasma light source.

26. The high efficiency lamp apparatus of claim 25, wherein there is an insulating layer gaseous space in between the glass plate and a peripheral edge of the lamp body.

27. A high efficiency lamp apparatus for productivity of a beam of polarized light comprising:

- a) an electrodeless ceramic lamp body in the form of concave walled shell;
- b) a clear light transmitting plate member fastened to the lamp body at the periphery, the plate member and lamp body defining a chamber;
- c) a connection for holding the plate member and lamp body together;
- d) the connection including a frit seal positioned in between the plate member and lamp housing;
- e) the chamber containing a gas that can be excited to form a plasma light source; and
- f) wherein a light beam generated by the plasma light source exits the lamp body through the plate member.

28. The high efficiency lamp apparatus of claim 27, wherein the lamp body comprises flat circular and cylindrically shaped wall portions.

29. The high efficiency lamp apparatus of claim 27, wherein the plate member
5 attaches to the lamp body at a connection that includes a frit seal.

30. The high efficiency lamp apparatus of claim 27, wherein lamp body and plate member continuously abut along the periphery of the lamp housing.

10 31. The high efficiency lamp apparatus of claim 27, wherein the lamp housing comprises a concave walled portion and a peripheral portion with a flange.

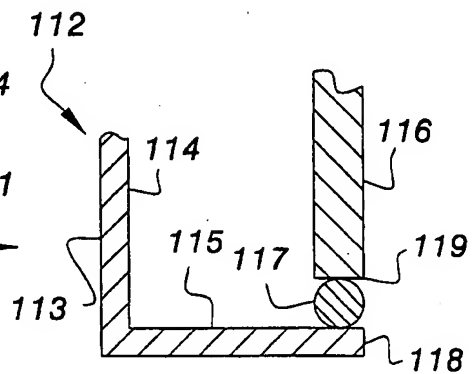
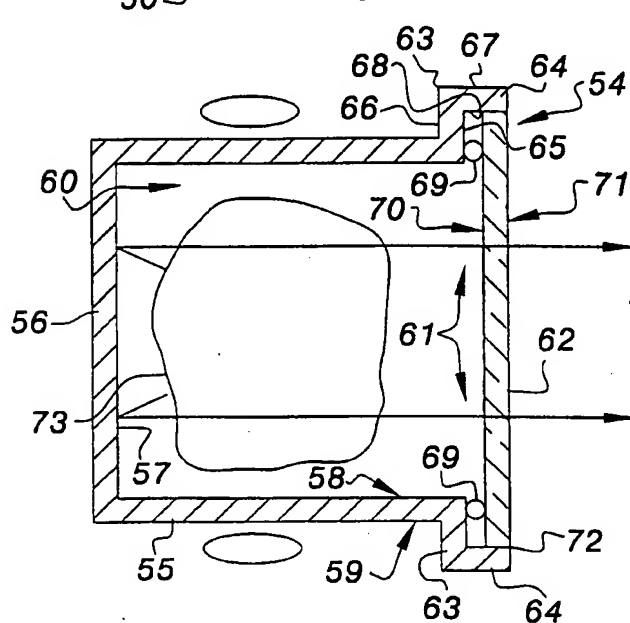
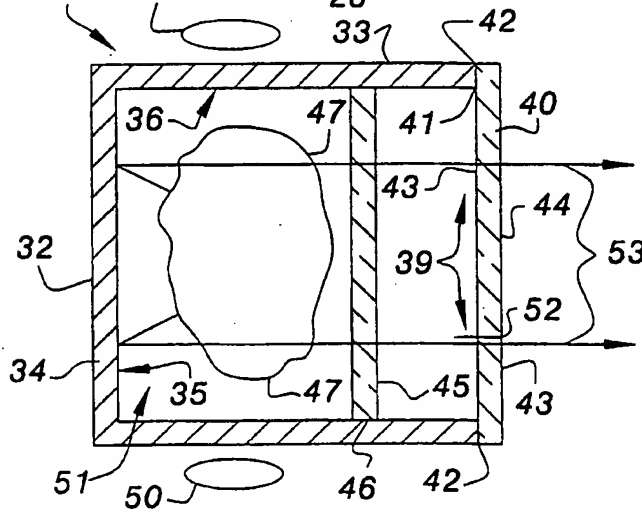
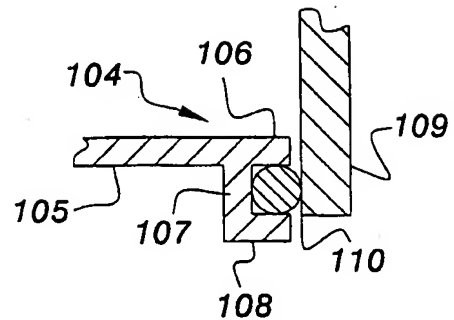
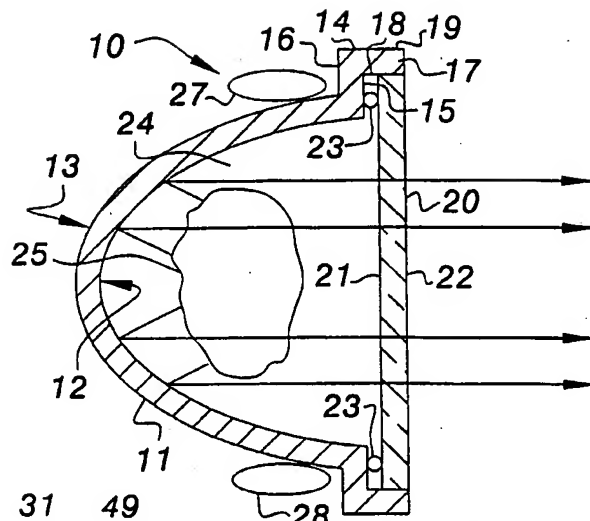
32. The high efficiency lamp apparatus of claim 31, wherein the clear plate member attaches to the lamp body at the flange.

15

33. The high efficiency lamp apparatus of claim 32 further comprising a frit seal positioned between the flange and the clear plate member.

20 34. The high efficiency lamp apparatus of claim 33 further comprising a reflector shroud attached to the housing at the flange.

1 / 4



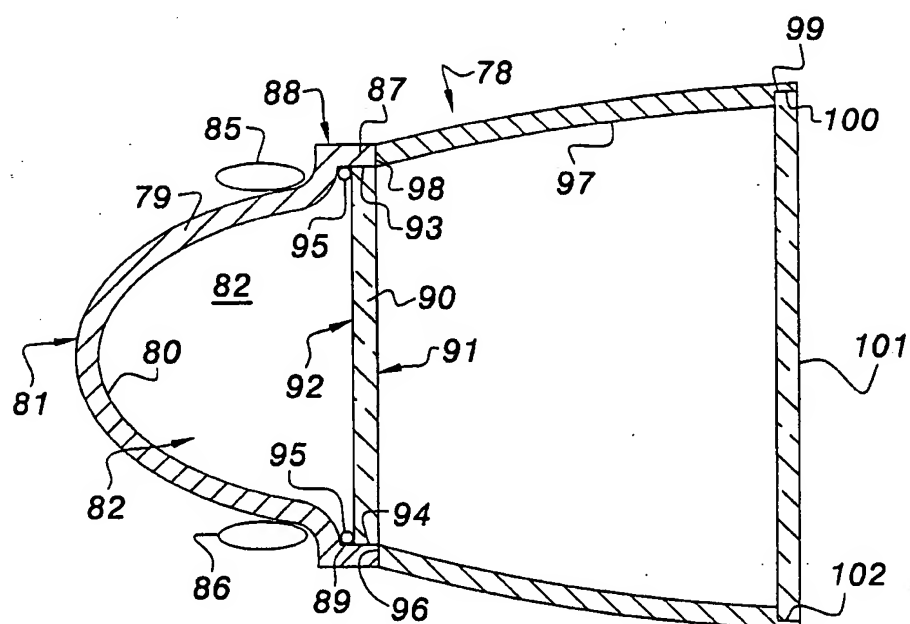


FIG.4

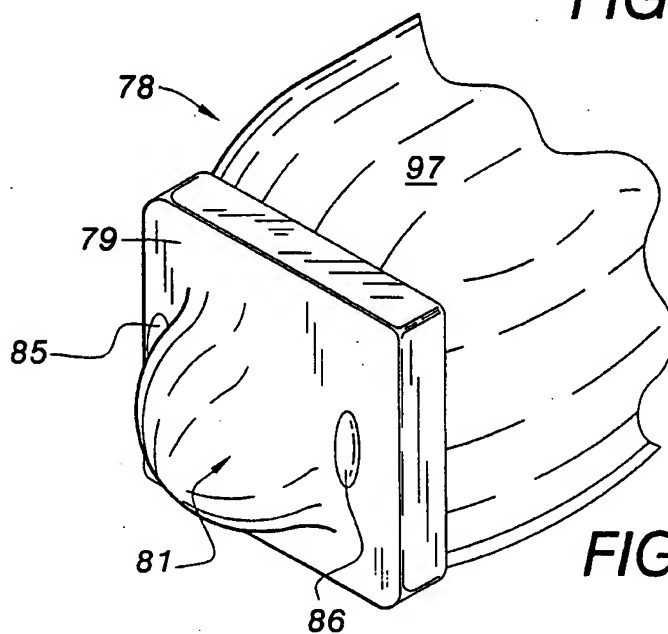


FIG.5

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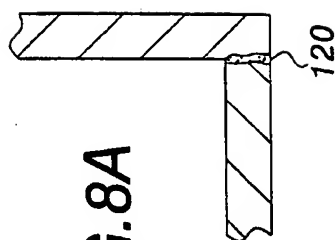


FIG. 8A

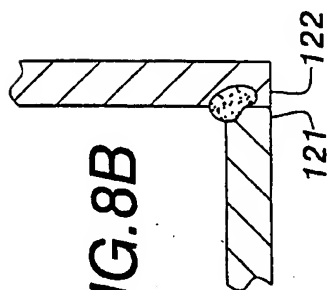
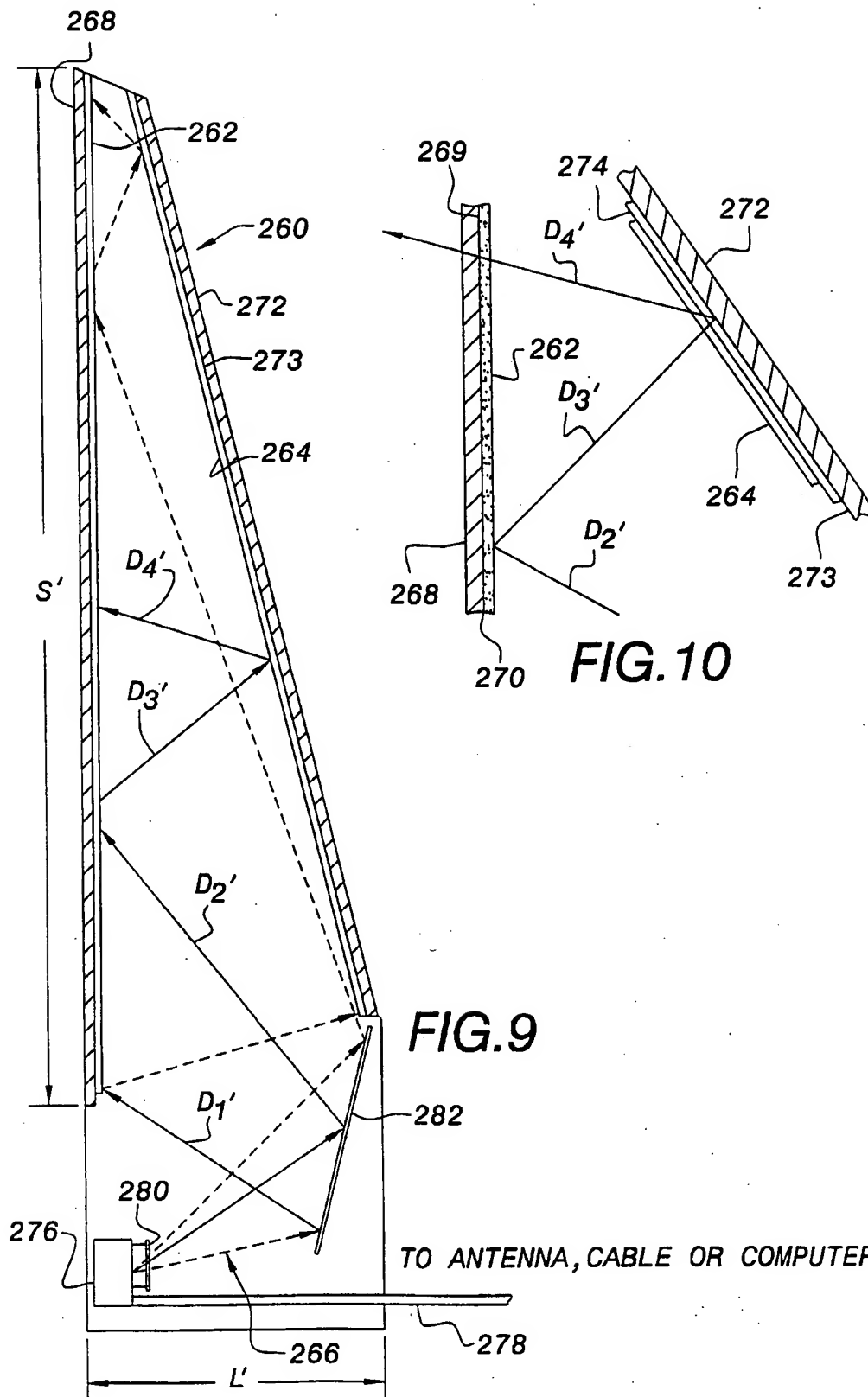


FIG. 8B



INTERNATIONAL SEARCH REPORT

International application No.

PCT/US97/22304

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) : H01J 61/30, 61/32, 61/34

US CL : 313/113, 112

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 313/110, 111, 112, 113, 114; 315/248; 362/19, 293

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y	US 3,860,854 A (HOLLISTER) 14 January 1975 (14.01.75) FIG. 2, 4, col. 7, lines 7-11.	1-3, 9, 13 ----- 4-8, 10-12, 14-34
Y	US 4,429,249 A (TYLER et al.) 31 January 1984 (31.01.84) col. 3, lines 3-12.	4-6, 14-24, 27-34
Y	US 5,404,076 A (DOLAN et al.) 04 April 1995 (04.04.95) abstract, col. 2, lines 48-59, FIG. 1.	11, 12
Y	US 4,882,617 A, (VRIENS) 21 November 1989 (21.11.89) col. 8, lines 12-18.	10, 25, 26

☒ Further documents are listed in the continuation of Box C.
 ☐ See patent family annex.

* Special categories of cited documents:	*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
A document defining the general state of the art which is not considered to be of particular relevance	*X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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L document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	*G* document member of the same patent family
O document referring to an oral disclosure, use, exhibition or other means	
P document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search 07 APRIL 1998	Date of mailing of the international search report 22 APR 1998
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer MICHAEL H. DAY / <i>M. Day</i> Telephone No. (703) 305-4941

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US97/22304

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 3,763,392 A, (HOLLISTER) 02 October 1973 (02.10.73)	
A	US 3,566,099 A (MAKAS) 23 February 1971 (23.02.71)	
A	US 3,631,288 A (ROGERS) 28 December 1971 (28.12.71)	

LIST OF MOTIONS, OPPOSITIONS AND REPLIES

Title	Comments
MORGAN R. C.; Espiau Reply 7 (in support of Espiau Motion 7 for Priority) dated September 28, 2007 (129pp), submitted to the USPTO in Patent Interference No. 105,393.	Cited in attached IDS
PISANO, N. A.; Guthrie Reply 7 dated September 28, 2007, (176pp), submitted to the USPTO in Patent Interference No. 105,393.	Cited in attached IDS
PISANO, N. A.; Guthrie Miscellaneous Motion 8 (to exclude evidence) dated October 10, 2007, (49pp), submitted to the USPTO in Patent Interference No. 105,393.	Cited in attached IDS
Teleconference Transcript of call before Judge James Moore, (22pp), dated October 4, 2007 in Patent Interference No. 105,393.	Cited in attached IDS
Hearing Transcript before Judge Sally C. Medley, dated March 8, 2007, (27pp), 2007 in Patent Interference No. 105,393.	Cited in attached IDS
MEDLEY, Judge Sally C., Decision – Interlocutory Motions (Paper No. 223), dated September 20, 2007, (3pp), in Patent Interference No. 105,393	Cited in attached IDS
MORGAN R. C.; Espiau Miscellaneous Motion 8 dated October 11, 2007 (32pp), submitted to the USPTO in Patent Interference No. 105,393.	Cited in attached IDS
MEDLEY, Judge Sally C., Decision – Interlocutory Motions – Bd.R.125(b), dated September 20, 2007, (3pp), in Patent Interference No. 105,393	Cited in attached IDS
Teleconference Transcript of call before Judge Judge Sally c. Medley, (26pp), dated October 15, 2007 in Patent Interference No. 105,393.	Cited in attached IDS

LIST OF EXHIBITS

Exhibit No.	Title from Exhibit Lists in Interference No. 105,393	Comments
1255	July 21, 2000 Fax Cover Sheet from George Thotus re: 646 Univ. Ave.	Cited in attached IDS
1256	Revocation of Power of Attorney, Application No. 09/818,092	Cited in attached IDS
1257	Espiau Second Declaration of F. Matthew Espiau	Cited in attached IDS
1258	International Publication No. WO 98/28780	Cited in attached IDS
1259	Transcript of the September 17, 2007 Deposition of Ellen Thotus	Cited in attached IDS
1260	Transcript of the September 18, 2007 Deposition of Benjamin Glenn	Cited in attached IDS
1261	Transcript of the September 18, 2007 Deposition of Penny Ortega	Cited in attached IDS
1262	Espiau Third Declaration of Brian P. Turner	Cited in attached IDS
1263	Errata to the Transcript of the September 18, 2007 Deposition of Benjamin Glenn	Cited in attached IDS
1264	Errata to the Transcript of the September 17, 2007 Deposition of Ellen Thotus	Cited in attached IDS
1265	Photograph of 644 University Avenue, Los Gatos, California	Cited in attached IDS
1266	Sketch of basement of 644 University Avenue, Los Gatos, California	Cited in attached IDS
1267	Photograph of basement of 644 University Avenue, Los Gatos, California	Cited in attached IDS

Exhibit No.	Title from Exhibit Lists in Interference No. 105,393	Comments
1268	Photograph of basement of 644 University Avenue, Los Gatos, California	Cited in attached IDS
1269	Photograph of basement of 644 University Avenue, Los Gatos, California	Cited in attached IDS
1270	Combination Diagram of EX1267, EX1268, EX1269 and EX2242 Exhibit B	Cited in attached IDS
1271	Espiau Second Declaration of Matthew Argenti	Cited in attached IDS
1272	Email from Robert C. Morgan to Nicola A. Pisano, October 1, 2007	Cited in attached IDS
1273	Espiau's Objections to Guthrie's Exhibits Served With Its Reply 7, with email service	Cited in attached IDS
2240	Second Declaration of Joe Bennett dated September 24, 2007	Cited in attached IDS
2241	Declaration of Ray Paquette dated September 20, 2007	Cited in attached IDS
2242	Third Declaration of Charles Guthrie dated September 26, 2007	Cited in attached IDS
2243	Sixth Declaration of Madhu Gupta dated September 27, 2007	Cited in attached IDS
2244	Declaration of James E. King, Esq. dated September 27, 2007	Cited in attached IDS
2245	Transcript of August 1, 2007 hearing	Cited in attached IDS
2246	Video of Red Herring interview of Tony McGettigan posted at http://redherring.tv/luxim.htm as of September 11, 2007	Video, not cited – see Exhibit 2247 for transcript
2247	Transcript of Red Herring interview of Tony McGettigan posted at http://redherring.tv/luxim.htm as of September 11, 2007	Cited in attached IDS

Exhibit No.	Title from Exhibit Lists in Interference No. 105,393	Comments
2248	Guthrie's Objections to Espiau's Opposition 6 Evidence, dated June 5, 2007	Cited in attached IDS
2249	Guthrie's Objections to Espiau's Motion 7 Evidence, dated August 7, 2007	Cited in attached IDS
2250	Guthrie's Objections to Espiau's Evidence, dated August 14, 2007	Cited in attached IDS
2251	Guthrie's Objections to Espiau's Opposition 7 Evidence, dated September 10, 2007	Cited in attached IDS
2252	Guthrie's Objections to Espiau's Exhibits 1255 and 1256, dated September 24, 2007	Cited in attached IDS
2253	Guthrie's Objections to Espiau's Reply 7 Evidence, dated October 1, 2007	Cited in attached IDS